

Completed Pollution Prevention Project Case Study

United States Department of Energy
Office of Environmental Management
Fact Sheet

Substituting Lead Shielding with Non-Hazardous Materials Los Alamos National Laboratory

Original Problem

Lead bricks that were used to protect workers from the radioactivity of several types of chemicals during experiments became mixed low level waste when the bricks were no longer usable. The lead bricks were expensive to dispose of when they became waste, and the lead was a potential toxicity hazard for workers as well.

The Project Solution

As part of the hazardous material elimination program, team members from TA-55 and the CMR Facility decided that the lead bricks used for shielding could be the first hazardous materials eliminated. The substitutions are tungsten-based bricks when shielding must be related to its density and bismuth-based bricks when shielding must be related to its molecular weight. The hazardous materials coordinators at the sites plan to remove approximately 2000 more lead bricks from the facilities in the next five years and replace them with either the non-hazardous tungsten or bismuth substitutes.

Value of Improvement

Lead will no longer be purchased for any shielding purposes by these two sites, thereby eliminating an expensive waste stream as well as a potential toxicity hazard to the employees. Employee safety is additionally improved because the tungsten-based bricks are as efficient at shielding as lead bricks, and the bismuth-based bricks are even more efficient than lead.

Lifecycle Waste Reduction

Lifecycle Waste Reduction	5200lb(to date)
Commencement Date	2001
Project Useful Life (Years)	Indefinite



DOE Monetary Benefits

Total Project Cost	~\$25,000
Lifecycle Savings	~\$33,000 to date
Return on Investment	NA

Benefits At-A-Glance

- Lead will no longer be used at two sites, eliminating a mixed low-level waste stream and a potential toxicity hazard. Training and administrative costs related to the lead bricks will be eliminated.
- The substitute bricks made of tungsten or bismuth are non-hazardous and at least as efficient as lead for shielding.
- Oak Ridge Laboratory will turn the lead bricks from these two facilities into linings for waste disposal drums that can be used at the WIPP site.

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Summary Data	
Priority Area:	Waste Minimization Projects
Project Type:	Substitution / Recycling
Total Project Cost:	~\$25,000
Lifecycle Savings:	~\$33,000 to date
Implementing Groups:	TA-55 and CMR Facility
Benefiting Group:	TA-55 and CMR Facility
Useful Life Years:	Indefinite
Return on Investment:	NA
Lifecycle Waste Reduction:	~50,000lb expected over the next five years
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